Problem Set 7 Calculus 2 Due 4/16/04

You are encouraged to work in groups of two to four on this assignment and make a single group submission. Each problem is worth 5 points. For full credit indicate clearly how you reached your answer. All work must be legible and submitted on clean paper without ragged edges.

1. A slice of bread is 5% covered with mold at time zero, and 10% covered 12 hours later. If the mold coverage increases logistically:
a) Write a differential equation for the mold growth.
b) Find a general solution to the differential equation.
c) Find a particular solution satisfying the given conditions.
d) How much of the slice is covered after 48 hours?
e) How much of the slice is covered after 96 hours?

2. Suppose a lake is capable of supporting a population of 3000 fish of a particular species, and that the population will grow logistically with a growth coefficient of 0.0001 (with time measured in years).
a) Find a general solution to the differential equation.
b) Find a particular solution satisfying the initial condition $p(0) = 1000$.
c) How long (to the nearest year) will it take for the fish population to reach 2500?

3. What happens if the fish from the lake in problem 2 are harvested at a continuous rate of
a) 100 fish per year
b) 200 fish per year
c) 250 fish per year
Use any approach(es) that seem reasonable to you to answer this – Euler's method and slope fields are options in addition to separation of variables.

4. Take your pick of Problem #8 or Problem #10 in §11.7.